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A review of strategies to improve rational prescribing in asthma

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Abstract

Background: There are well-recognised gaps between evidence-based recommendations and prescribing practices in asthma. While different strategies have been devised to improve rational prescribing, the impact of these is uncertain.

Aim: To examine the characteristics and effectiveness of strategies to improve rational prescribing in asthma.

Method: We systematically searched electronic databases to find studies that reported on strategies to improve prescribing in asthma, or included rational prescribing as one of the main components of the program.

Results: There were thirteen relevant studies. All of the strategies described in these studies involved physician education using a variety of modalities; two of the trials also included patient-specific prescribing direction. Twelve of thirteen studies reported improved prescribing practice. There was significant heterogeneity in the interventions and outcome criteria employed by the studies.

Conclusion: Strategies to improve rational prescribing in asthma show promise, but the significant methodological heterogeneity, and the absence in most cases of demonstrable clinical benefit, raise concerns about their applicability in clinical practice.

Keywords

asthma, inappropriate prescribing, medication therapy management, physician's practice patterns, quality improvement

Introduction

The World Health Organization's Guide to Good Prescribing outlines the steps involved in rational medicines use: defining the clinical problem and therapeutic aims, assessing efficacy and safety, commencing treatment, providing instructions, including about potential adverse effects, and monitoring treatment.¹ The Quality use of Medicines (QUM) framework adopted in Australia is a broader concept that considers the patient, doctor, other health professionals and policy factors that impact on medicine use. The Quality Use of Medicines framework has established rational prescribing as a national health priority, and a key strategy to improving the quality and cost-effectiveness of healthcare in Australia.² However there are numerous barriers to rational prescribing in clinical practice, including: commitment to established therapies, scepticism towards, and ignorance of, novel drugs, and limited resources available for non-commercially sponsored education about evidence based treatments.^{3,4} The management of asthma, one of the most commonly encountered chronic diseases in primary care, may be used as an exemplar of the issues raised by efforts to improve rational prescribing.

The key aim in management of asthma is to decrease airway inflammation and achieve disease control: this requires the judicious use of 'preventer' medications if necessary (most commonly inhaled corticosteroids), and not simply acute treatment of symptoms with short acting bronchodilators.⁵ Step up therapies including long acting beta agonists or leukotriene receptor antagonists should be considered if there is insufficient disease control.⁶ Unfortunately, there remains a gap between the recommendations of evidence based guidelines and documented prescribing practices for asthma in primary care. The Australian CareTrack study recently assessed the appropriateness of care for a number of common diseases, and found that asthma patients received care consistent with evidence based guidelines in only 38% of encounters.⁷ The reasons for this are unclear but, as Goeman and colleagues found in a report on a survey of Australian general practitioners, barriers to achieving optimal management of asthma may include time limitations, cost and poor access to education and training.⁸

This gap has spurred the development of strategies to improve prescribing practices, including physician education programs via individual or group teaching from other clinicians and pharmacists, distance education and/or case conferences, clinical audit, and feedback.⁹ A number of studies have examined the impact of these strategies on clinical practice and/or patient outcomes. This study provides a qualitative review of the evidence for the efficacy of strategies to improve rational prescribing in asthma.

Methods

Search strategy

The search strategy aimed to capture all recent studies of programs to improve rational prescribing in asthma. We performed a search of the Medline, Embase and the Cochrane databases for studies published in English and dated from January 2004 to August 2014 using MeSH terms and keywords for titles and abstracts. Search terms related to asthma, airways disease, prescription, appropriate prescription, rational prescription, inhalers, bronchodilators, corticosteroids, reliever, preventer, management and clinical practice guidelines. The purposefully broad search allowed the capture of studies that did not use the term 'rational prescribing', but did study the concept. The abstracts were reviewed, and the references of included studies were reviewed for any additional relevant studies.

Study inclusion, selection and analysis

This review focused on studies that examined strategies to improve rational prescribing for asthma. Studies of programs that did not specifically describe the effect of interventions on prescribing were excluded.

Inclusion criteria:

- Studies based in the primary care setting
- Primary focus of at least one arm of intervention on prescribing of medications
- Target population of children and/or adults

Exclusion criteria:

- Primarily hospital or emergency based programs
- Primary focus of program not on prescribing (for example disease monitoring, inhaler technique, application of generic management guidelines)

A quality assessment of all trials was completed using the Cochrane risk of bias tool for randomised and non-randomised trials as described by the Cochrane Effective Practice and Organisation of Care.¹⁰ The following criteria were considered: randomisation, allocation concealment, baseline outcomes and characteristics, treatment of incomplete data, blinding, contamination, and selective reporting. An overall rating of bias was given with grades low, moderate and high. Studies were analysed according to study design, population size, target population, location, strategy and outcome measures. Studies with common methods and/or outcomes were grouped together to facilitate qualitative analysis.

Results

Study characteristics and quality assessment

From the initial search 13 studies met the inclusion criteria, with the remainder excluded due to an insufficient focus on prescribing as the key component of the study intervention. However given the broad inclusion criteria, the studies did vary significantly in their methodology; study characteristics and the overall assessment of bias are summarised in Table 1. Eight of the thirteen studies were randomised controlled trials, involving the randomisation of either individual general practitioners or cluster randomisation primary care groups or sites. The remainder of the studies were prospective observational or cohort studies that tracked outcomes with time and compared outcomes to the control group or to historical outcomes.

A quality assessment of the 13 included studies rated four studies at low, four at moderate and five at high risk of bias. Contributing factors to the risk of bias was inadequate or incomplete explanation of randomisation and blinding procedures. Issues of contamination were not addressed in most of the trials, including those studies utilising cluster randomisation. More generally there was inconsistent reporting of baseline characteristics and outcomes. The measurement of clinical outcomes was further complicated by the heterogeneity in the definition of rational prescribing: some studies defined this in terms of adherence to asthma management guidelines, while others more broadly described rational prescribing in terms of minimisation of the prescription of short acting bronchodilators and increase in preventer therapy (for example inhaled corticosteroids).

Study	Study population	Study type	Intervention description	Length of follow up	Outcome measures	Risk of bias
Lee et al. ¹¹	n=249 physicians n= 14292 children aged 5-18	Prospective observational study	Review of current patient medications and education material mailed to treating physician	12 month follow up	Drug utilisation, hospitalisations and emergency visits Program satisfaction	High
Davis et al. ¹²	Primary care physicians (n=20 intervention, n=34 control)	Controlled study	3 teleconferences with interactive discussion of clinical cases	6 month follow up	Prescribing practices Program satisfaction	High
Lozano et al. ¹³	Paediatric primary care clinics (n=42), children aged 3-17 (n=638)	Randomised controlled trial	Three groups: (A) usual care, (B) peer education, (C) peer education <i>and</i> nurse-mediated organisation change	2 year study duration	Asthma symptoms, health status, frequency of 'bursts' of oral steroids	Moderate
Witt et al. ¹⁴	Primary care physician practices (n=47 intervention, n=53 control)	Cluster randomised controlled trial	Education using locally developed guideline and prescribing data, either through personal education or via correspondence	12 month follow up	Prescribing practices, physician use of spirometry and peak flow	Moderate
Cloutier et al. ¹⁵	Primary care clinics (n=6), 3748 children	Cohort study	Management program for assessment of asthma, clinical severity and prescribing	4 years study duration	Hospitalisation and emergency room admissions, prescribing practices	Moderate
Moonie et al. ¹⁶	Primary care clinics (n=2), 723 patients aged 1-85	Prospective observational study	Standardised forms for assessment of symptoms and prescribing, personal education sessions	12 month study duration	Accuracy of physician assessment, prescribing practices (consistency with guidelines)	High
Mitchell et al. ¹⁷	Primary care physicians (n=270)	Randomised controlled trial	Education session based on care pathway	24 month study duration	Hospital and emergency room admissions	Low
Kattan et al. ¹⁸	Primary care, children aged 5-11 (n=466 intervention, n=463 usual care)	Randomised controlled trial	Assessment of patient symptoms and brief guidance to physicians based on national guidelines	12 month follow up	Asthma symptoms, hospitalisations, ED visits, physician visits, prescribing practices	Low

Hagmo n of ten Have et al. ¹⁹	Primary care, children aged 7-17 (n=404)	Randomised controlled trial	Three groups: (A) guideline dissemination (B) guideline dissemination and education, (C) guideline dissemination, education and treatment advice	12 month follow up	Airway hyperresponsiveness (primary), asthma symptoms, peak flow, prescribing practices (secondary)	Moderate
Cho et al. ²⁰	Primary care (n=377 physicians, n=4682 patients)	Prospective observational study	Computer assisted program on management	3 month follow up	Symptom scores, prescribing practices	High
de Vries et al. ²¹	Primary care, children aged 0-14 (n=1447 intervention, n=3527 reference group)	Prospective observational study	Pharmacist education of primary care physicians based on guidelines	unclear	Prescribing practices	High
Bell et al. ²²	Primary care practices (n=12), children aged 2-18	Cluster randomised trial	Clinical decision support embedded in electronic health record	24 months follow up	Controller medication prescription, asthma plan, spirometry	Low
Shah et al. ²³	Primary care practitioners (n=66 intervention, n=56 usual care), children aged 2-14	Randomised controlled trial	Small group physician led interactive workshop	12 month follow up	Asthma symptoms, prescribing practices, GP feedback, asthma action plan	Low

Above: Table 1. Characteristics of those studies included in the review

Impact of strategies to improve prescribing

Twelve of thirteen studies in this review reported strategies that were successful in improving rational prescribing in asthma: a description of the interventions and the outcomes are summarised in Table 2. Most of the studies evaluated physician educational programs including provision of written educational materials and interactive case-based teleconferences with content experts. Each study utilised a different definition of rational prescribing depending on the clinical context and study aims: in general they aimed for increased use of inhaled corticosteroids (ICS), minimisation of short acting bronchodilators (SABAs), and had varying approaches to long acting bronchodilators (LABAs), reflecting the ongoing debate about the place of LABAs in asthma management.^{24,25} Table 2 indicates whether results were positive based on each study's respective outcome measures.

Davis et al. delivered education to physicians using interactive case based discussions, and demonstrated an increase in prescription of inhaled corticosteroids (ICS) from 2.54 per month to 7.76 per month ($p < 0.001$).¹² Shah et al. found that their education program decreased the rate of ICS prescribing in patients with infrequent symptoms, but did not change any clinical outcomes.²³ de Vries et al. described a pharmacist led education program that increased the number of children with short acting bronchodilator (SABA) prescriptions ($p < 0.01$), and decreased the number of children on long acting bronchodilators (LABA) with no prescribed ICS ($p = 0.03$).²¹ Mitchell et al. used education sessions to outline validated clinical pathways, with a subsequent decrease in oral reliever medications (48.4% in intervention group, 28.6% in control, $p < 0.001$), and reduction in hospitalisation.¹⁷ In the only study to find no impact on prescribing practice, Witt et al. found that guideline based education delivered personally or via correspondence did not change prescribing rates of SABAs or ICS.¹⁴

Some of the studies examined more multifaceted interventions. Lozano et al. compared usual care with peer leader education, and with peer leader education combined with nurse driven organisational change: the latter two groups both had reduced prescribing of short course steroids, and had 6.5 and 13.3 fewer asthma symptom days over 2 years respectively ($p = 0.02$).¹³ A Dutch group compared three interventions: guideline dissemination (A), guideline dissemination and education (B), guideline dissemination, education and treatment advice (C). Although there was an increase in use of ICS in group C (0.4 puffs/day compared to 0.3 puffs/day for groups A and B), there was no difference in the primary clinical endpoint of airway hyper-responsiveness between the groups.¹⁹ Cloutier et al. studied an adaptive set of guidelines individualised for patients, that resulted in increased appropriate controller medication use and a 35% decrease in hospitalisation ($p < 0.006$).¹⁵

Some programs extended beyond education to specific advice about the management of individual patients. Kattan et al. described a program where clinical information, including medications use, was collected from patients and their families, and then provided to their primary care physician in conjunction with recommendations for medication changes.¹⁸ This resulted in a significant increase in appropriate stepping up of asthma therapy (46% of visits) compared to a control group (35.6% of visits). Lee et al. studied the impact of providing a review of individual patient medications in addition to educational material: although there was a drop in SABA use from 300 to 200 puffs per month, there was no change in clinical outcomes as measured by emergency visits and asthma related hospitalisation.¹¹

Technology can facilitate the individualisation of prescribing advice, as education can be integrated with electronic health records. Cho et al. described such a program that reduced the use of SABAs and systemic steroids and increased preventer medication use.²⁰ Bell et al. also reported on an integrated electronic program with success in urban paediatric practices, increasing the use of preventer medications.²²

Study	Prescribing practices	Clinical outcomes	Physician outcomes
Lee et al. ¹¹	Decrease in SABA use from 300 to 200 puffs per month and change in LABA utilisation in 83% of participants [discontinuation of LABA or addition of SABA] (positive change)	No change in emergency visits or asthma related hospitalisation	56% modified their drug therapy 70% intend to use “Asthma diary” in their practice
Davis et al. ¹²	Increase in prescription of ICS from 2.54 per month to 7.76 per month (p<0.001) (positive change) No change in SABA use (negative change)	No measurement of clinical outcomes	80% believed program changed prescribing practices
Lozano et al. ¹³	Peer leader group: 36% reduction in oral steroid bursts Planned care group: 39% reduction in oral steroid bursts (positive change)	Peer leader group: 6.5 fewer asthma symptom days (non -significant reduction) Planned care group: 13.3 fewer asthma symptom days (p=0.02)	No physician outcomes reported
Witt et al. ¹⁴	No difference between control and intervention groups in prescribing of SABA and ICS (negative change)	No specific clinical outcome measures reported	No dropout of physicians from intervention group
Moonie et al. ¹⁵	Appropriate prescribing (as per NAEPP guidelines) improved with time from 69% at first visit to 91% at visit 4 (p=0.02) (positive change)	No specific clinical outcome measures reported	No physician outcomes reported
Kattan et al. ¹⁶	46% of visits resulted in appropriate step up of therapy (as per NAEPP guidelines) compared to 35.6% in control group (p=0.03) (positive change)	Intervention: fewer emergency visits (0.83/year compared to 1.14/year for control, p=0.013), no significant difference in hospitalisation, symptoms days or school missed	No physician outcomes reported
Have et al. ¹⁷	Increase in use of ICS in group C (0.4 puffs/day compared to 0.3 puffs/day for groups A and B, p<0.05) (positive change) No change in use of SABA use (negative change)	No difference between groups in airway hyperresponsiveness (p=0.09), improvement in nocturnal symptoms groups A and C	No physician outcomes reported
de Vries et al. ¹⁸	Increase number of children with SABA prescriptions (p<0.01), fewer children on LABA with no ICS (p=0.03) (positive change)	No specific clinical outcome measures reported	No physician outcomes reported
Shah et al. ¹⁹	Patients with infrequent symptoms had lower ICS and LABA use (p=0.02) (positive change)	No statistically significant difference in child days away from school or parent days away from work	General practitioners more confident communicating with patients (p=0.03)

SABA = short acting bronchodilators, LABA = long acting bronchodilators, ICS = inhaled corticosteroids, NAEPP = national asthma education and prevention program.

Above: Table 2. Summary of results of reviewed studies

Discussion

This review suggests that strategies (most of which involve physician education) have the capacity to improve the rate of rational prescribing in asthma, with eight of nine studies demonstrating improvement in at least one prescribing parameter. Despite this, the heterogeneity of these studies, concerns about study quality, and limitations in the methodology such as single time-point analysis of outcomes and use of surrogate outcomes, limits our capacity to draw generalisable conclusions or to make any judgment regarding the most effective strategy to improve the quality of prescribing.

Insofar as patient outcomes were measured, there was great variability in the definition of clinical endpoints such as symptom control, exacerbations, and quality of life, and no study consistently followed The American Thoracic Society and European Respiratory Society recommended outcome measures for assessing treatment effects.²⁶ Furthermore the practical applicability of the programs was not addressed by all the studies, with only a minority reporting on physician satisfaction and willingness to adopt the strategies in their routine clinical practice.

It may be unrealistic to hold these small studies of interventions to improve prescribing to the standard of clinical trials of new therapies; however our findings do demonstrate the need for more consistent and rigorous studies of interventions to improve prescribing practice. In particular, we need a more consistent definition of rational prescribing, both in general and in relation to asthma. We also need more consistent adherence to standards for assessing effects of interventions. Without this, efforts to improve the “quality use of medicines” will continue to struggle.

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